

REMARKS

SPECIFICATION

In the May 11 Office Action, the Patent Office requires Applicant to amend the specification, by deleting the reference to the date “d6” at the paragraph at page 1, line 7-9. In response, Applicant has amended the specification by deleting this reference.

In the paragraph at page 2, lines 8-21, Applicant has corrected the spelling of the word “achieved” (at line 11), and deleted the date reference “d3/” (line 13).

In the paragraph at page 3, line 7, Applicant has deleted the date reference “d5/”.

Also, in the paragraph at page 3, lines 9-14, Applicant has deleted the date references “d7/” (line 12) and “d3/” (line 14).

In the paragraph at page 4, lines 26-27, Applicant has corrected the spelling of the word “benefited”.

In the paragraph page 7, lines 12-19, Applicant has corrected the spelling of the word “unforeseen”.

Applicant has amended the specification at the paragraph at page 9, lines 19-22, by inserting a brief description of Figure 3. Support for this amendment can be found in the originally-filed specification at page 13, lines 13-20 and continuing at page 14, lines 1-10.

Applicant has amended the specification at page 10, lines 2-12, by inserting a description of Figure 1. Support for this amendment can be found in the originally-filed specification at page 9, lines 15-17.

Applicant has amended the specification at page 13, lines 13-20, by inserting "310" which is merely a number indicator for the continuity loops, and by inserting "305" which is merely a number indicator for the seams, and by inserting "Figure 3". Support for these amendments can be found in the originally-filed specification at page 13, lines 13-20 and continuing at page 14, lines 1-10.

Applicant has amended the specification at page 14, lines 1-10, by inserting "310" which is merely a number indicator for the continuity loop. Support for this amendment can be found in the originally-filed specification at page 13, lines 13-20 and continuing at page 14, lines 1-10.

Applicant has also amended the specification at page 14, lines 12-20, by inserting "270" which is merely a number indicator for the pressure sensing devise. Support for this amendment can be found in the originally-filed specification at page 14, lines 12-20.

In the May 11 Office Action, the Patent Office requires Applicant to submit a new Abstract on a separate sheet, apart from other text. In compliance with this requirement, Applicant provides herein a separate sheet containing the amended Abstract (attached hereto as Exhibit D). Support for the Abstract can be found in the originally-filed specification at page 16, the section entitled "Abstract".

The amendments to the specification do not contain new matter. Entry of these amendments is respectfully requested.

CLAIMS

Originally-filed claims 1-7 are pending and being examined. Applicant has cancelled claims 1-7 and added new claims 8-26. New claims 8-26 contain no new matter and their entry is respectfully requested.

Support for new claim 8 can be found in the originally-filed specification at page 8, lines 14-20; page 9, lines 15-17; page 11, lines 2-4, 8-11 and 20-21; page 12, lines 1-5, 9-10, and 16-19; page 13, lines 8-11; page 14, lines 5-13; and Figure 1.

Support for new claim 9 can be found in the originally-filed specification at page 11, lines 8-11 and line 20; page 12, lines 1-2.

Support for new claim 10 can be found in the originally-filed specification at page 9, lines 10-12.

Support for new claim 11 can be found in the originally-filed specification at page 8, lines 7-9; and page 13, lines 13-14.

Support for new claim 12 can be found in the originally-filed specification at page 8, lines 14-20.

Support for new claim 13 can be found in the originally-filed specification at page 10, lines 7-15; and Figure 2.

Support for new claim 14 can be found in the originally-filed specification at page 10, lines 7-17.

Support for new claim 15 can be found in the originally-filed specification at page 10, lines 14-17.

Support for new claim 16 can be found in the originally-filed specification at page 10, lines 14-19.

Support for new claim 17 can be found in the originally-filed specification at page 8, lines 14-20; page 9, lines 15-17; page 10, lines 7-17; page 11, lines 2-4, 8-11 and 20-21; page 12, lines 1-5, 9-10, and 16-19; page 13, lines 8-11; page 14, lines 5-13; and Figures 1 and 2.

Support for new claim 18 can be found in the originally-filed specification at page 8, lines 14-20; page 9, lines 15-17; page 11, lines 2-4, 8-11 and 20-21; page 12, lines 1-5, 9-10, and 16-19; page 13, lines 8-11; page 14, lines 5-13; and Figure 1.

Support for new claim 19 can be found in the originally-filed specification at page 9, lines 10-12; page 12, lines 9-10.

Support for new claim 20 can be found in the originally-filed specification at page 11, lines 8-11 and line 20; page 12, lines 1-2.

Support for new claim 21 can be found in the originally-filed specification at page 9, lines 10-12; page 13, lines 5-11.

Support for new claim 22 can be found in the originally-filed specification at page 8, lines 14-20.

Support for new claim 23 can be found in the originally-filed specification at page 10, lines 7-15; and Figure 2.

Support for new claim 24 can be found in the originally-filed specification at page 10, lines 7-17.

Support for new claim 25 can be found in the originally-filed specification at page 10, lines 14-17.

Support for new claim 26 can be found in the originally-filed specification at page 10, lines 14-17.

REJECTION OF THE CLAIMS

Rejection of Claim 4:

In the May 11 Office Action, the Patent Office rejects claim 4 because it is an improper multiple dependent claim. The rejection of claim is now moot because Applicant has cancelled claim 4.

Rejection of Claims 1-3, 5 and 7 Under 35 U.S.C. §112, Second Paragraph:

In the May 11 Office Action, the Patent Office rejects claims 1-3, 5 and 7, under 35 U.S.C. §112, second paragraph. These rejections are now moot because Applicant has cancelled claims 1-7 and added new claims 8-26. Applicant believes new claims 8-26 comply with the requirements of 35 U.S.C. §112, second paragraph.

Rejection of Claims Under 35 U.S.C. §102(b):

In the May 11 Office Action, the Patent Office rejects claims 1-3 and 5-7, under 35 U.S.C. §102(b), as being anticipated by the disclosure in:
<http://science.ksc.nasa.gov/shuttle/missions/sts-107/mission-sts-107.html>,
referred to herein after as the “STS-107” reference.

Applicant has cancelled originally-filed claims 1-7 and replaced them with new claims 8-26. New claims 8-26 do not contain new matter.

Applicant's Invention

The present invention provides a grid which directly detects damage to the thermal protection surface of a vehicle. The grid itself functions as a damage-detecting sensor on the surface of the vehicle. The grid detects damage to the surface in real-time by rapidly assessing the damage and providing information of the damage in a timely fashion. The grid detects the damage at any time during the mission from pre-launch to re-entry, including: pre-launch; launch; in flight; in orbit; and re-entry. In one embodiment, the grid detects damage during pre-launch thereby permitting a timely decision to abort the launch. In another embodiment, the grid detects damage at any time prior to re-entry, thereby permitting a timely decision to abort re-entry. These timely decisions can save the vehicle and its crew from catastrophic failure. Additionally, the grid accommodates any shape of the vehicle, which permits the grid to detect and localize damage to any location on the thermal protection surface or damage to the seams that connect parts of the vehicle.

The STS-107 reference does not teach a grid which directly detects damage to the thermal protection surface of a vehicle. Instead, the STS-107 reference teaches temperature and pressure sensors that are connected with wires routed inside the *Columbia* shuttle (see page 3; second paragraph, lines 16-19; "Wires from these sensors are routed inside the wing from the orbiter midbody..."). The wires disclosed in STS-107 serve as a conduit network to rout information, such as changes in temperature or pressure. The wires may form a grid, but this grid does not detect damage. Additionally, the sensors disclosed in STS-107 cannot directly detect damage. These sensors can only detect temperature or pressure anomalies which occur as secondary effects which may not be detectable until a time substantially after the time that damage to the thermal protection surface of the shuttle actually occurs. For example, during orbit, when there is minimal thermal gradient and minimal pressure gradient across the thermal protection surface, there is no temperature or pressure effect to be measured that could indicate damage. As disclosed in the STS-107 reference, the temperature and pressure sensors detected anomalies indicative of damage only after the thermal protection surface was already undergoing thermal

failure during re-entry. The STS-107 reference does not disclose the timing of damage to the thermal protection surface of the *Columbia* shuttle. However, it is now widely believed that the damage occurred during launch on January 16, 2003, but the increase in temperature and pressure resulting from the damage was not detected by the sensors until re-entry 16 days later, on February 1, 2003. By the time these sensors detected changes in temperature and pressure, and notified ground-crew of the changes, it was too late to abort the re-entry event. Additionally, the STS-107 sensors are restricted to distinct locations of the shuttle (e.g., landing gear wells, brake wells, fuselage, and inside the wings).

Therefore, the STS-107 reference does not teach each and every element of Applicant's claimed invention recited in new claims 8-26. Accordingly, the claimed invention in new claims 8-26 are novel.

Rejection of Claims 1-3, and 5 in view of STS-107:

In the May 11 Office Action, the Patent Office rejects claims 1-3 and 5, under 35 U.S.C. §102(b), as being anticipated by the disclosure in:

<http://science.ksc.nasa.gov/shuttle/missions/sts-107/mission-sts-107.html>,
referred to herein after as "STS-107".

The Patent Office states that the STS-107 reference discloses temperature sensors located in cavities beneath the thermal protection layer of the shuttle *Columbia*. In response, Applicant contends the STS-107 reference does not disclose a grid that detects damage to the thermal protection surface of a vehicle.

Rejection of Claim 2 in view of STS-107:

In the May 11 Office Action, the Patent Office rejects claim 2, under 35 U.S.C. §102(b), as being anticipated by the disclosure in the STS-107 reference. The Patent Office states that the STS-107 reference discloses a circuit that translates the electrical characteristics of a detection grid

into meaningful data. The Patent Office also states that the STS-107 reference discloses values from the sensors that are downloadable. In response, Applicant contends the STS-107 reference does not disclose a grid that detects the damage to the thermal protection surface of a vehicle.

Rejection of Claim 3 in view of STS-107:

In the May 11 Office Action, the Patent Office rejects claim 3, under 35 U.S.C. §102(b), as being anticipated by the disclosure in the STS-107 reference. The Patent Office states that the STS-107 reference discloses the redundant inclusion of pressure sensors which are located in cavities beneath the thermal protection layer of the shuttle *Columbia*. In response, Applicant notes this rejection is now moot because new claims 8-26 do not recite redundant pressure sensors.

Rejection of Claim 5 in view of STS-107:

In the May 11 Office Action, the Patent Office rejects claim 5, under 35 U.S.C. §102(b), as being anticipated by the disclosure in the STS-107 reference. The Patent Office states that the STS-107 reference inherently discloses firmware and software in the circuit of the grid. In response, Applicant contends the STS-107 reference does not disclose a grid that detects the damage to the thermal protection surface of a vehicle.

Rejection of Claim 6 in view of STS-107:

In the May 11 Office Action, the Patent Office rejects claim 6, under 35 U.S.C. §102(b), as being anticipated by the disclosure in the STS-107 reference. The Patent Office states that the STS-107 reference inherently discloses active or passive components at the intersection of the grid elements. In response, Applicant contends the STS-107 reference does not disclose a grid that detects the damage to the thermal protection surface of a vehicle.

Applicant notes that the Patent Office states the following:

“The electrical characteristics are measured as seen in the statements by the examiner in the previous rejections and these measurements will show when other elements fail due to physical trauma as stated previously and seen in the STS reference.” [underlining added by Applicant for emphasis]

Applicant respectfully contends the Patent Office is erroneous. The examiner has not made previous rejections in connection with the subject patent application. The Office Action, mail dated May 11, 2005, is the first Office Action received by the Applicant. Applicant is not aware of any other Office Action or other rejections.

Rejection of Claim 7 in view of STS-107:

In the May 11 Office Action, the Patent Office rejects claim 7, under 35 U.S.C. §102(b), as being anticipated by the disclosure in the STS-107 reference. The Patent Office states that the STS-107 reference inherently discloses the sensor grid is made of some material. Further, the STS-107 reference discloses a grid, if placed on the outside of the craft, would burn off during re-entry. In response, Applicant contends the STS-107 reference does not disclose a grid that detects damage to the thermal protection surface of a vehicle and the grid ablates off during re-entry.

Applicant believes the rejection of claims 1-3 and 5-7, in view of the STS-107 reference, is now overcome by new claims 8-26. Applicant requests the Patent Office to withdraw rejection of the claims under 35 U.S.C. §102(b).

REPLACEMENT DRAWINGS

Replacement Figures 1 and 2, and new Figure 3 are attached herewith as Exhibit C.

Pressure Sensors

In the May 11 Office Action, the Patent Office raised an objection to the drawings under 37 C.F.R. §1.83(a) because the pressure sensors are a feature of the invention specified in the claims, and the pressure sensors are not featured in the originally-filed drawings.

In response, Applicant has deleted originally-filed claim 3, and added new claims 8-26 which do not recite pressure sensors. The objection is now moot. Accordingly, Applicant has not included a depiction of pressure sensors in the drawings.

Continuity Loops

In the May 11 Office Action, the Patent Office raised an objection to the drawings under 37 C.F.R. §1.83(a) because the continuity loops are not depicted in the drawings, and the Patent Office deems the continuity loops to be a structural detail that is essential for proper understanding of the disclosed invention.

In response, Applicant submits a New Sheet for Figure 3 depicting a rocket having 305 seams between separate rocket sections, and 310 continuity loops located above and below the 305 seams. Support for new Figure 3 can be found in the originally-filed specification at: page 13, lines 13-20; and at page 14, lines 1-10.

New Figure 3 contains no new matter. Entry of Figure 3 is respectfully requested.

Telemetry System

In the May 11 Office Action, the Patent Office raised an objection to the drawings under 37 C.F.R. §1.84(p)(5) because they do not include a number indicator for the telemetry system. The Patent Office requires Applicant to include the number indicator “240” for the telemetry system.

In response, Applicant submits a Replacement Sheet for Figure 2 depicting “240” for the telemetry system.

Replacement Figure 2 contains no new matter. Entry of Figure 2 is respectfully requested.

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CONCLUSION

Entry of this amendment and the foregoing remarks in the file of the above-identified patent application is respectfully requested. Applicants believe that all grounds for rejection of the claims have been successfully overcome and that the claims are now in condition for allowance. Withdrawal of the Patent Office's remaining rejections is requested and prompt allowance of the claims is solicited. If any issues remain in connection with the claims, the Examiner is encouraged to contact the undersigned by telephone to discuss the same.

Respectfully submitted,

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